

Claims:

Cancel claims from 1 – 21 and substitute new claims 22 – 43 as follows:

Claims 1-21 (canceled)

Claim 22 (new): A multiple-input multiple-output wireless sensor networks communication system comprising:

N wireless sensor node and transceiver systems, where N is an integer;

each of the wireless sensor node and transceiver systems coupled to M antennas, where M is an integer;

said each of the wireless sensor node and transceiver systems further includes a sensor array unit, an analog-to-digital converter unit, a signal processing and data computing unit, a multiple-input multiple-output space-time transceiver, a memory bank, a power unit, and a power generator;

a wireless multiple-input multiple-output space-time sensor basestation system coupled to a sensor network interface that is connected to a sensor network; and

said wireless multiple-input multiple-output space-time sensor basestation system coupled to P antennas, where P is an integer.

Claim 23 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 22 wherein said sensor array unit includes N sensors in parallel, where N is an integer.

Claim 24 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 23

wherein each of the N sensors in parallel is a multifunction sensor device that can be used to sensor different input signals.

Claim 25 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 22 wherein said multiple-input multiple-output space-time transceiver further comprises a sensing data sequence stream, a forward error correction, interleaver and spreading, a space-time encoding, a modulation and radio frequency transmitter, and N antennas, where N is an integer.

Claim 26 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 25 wherein said forward error correction, interleaver and spreading further includes a convolution encoder, an interleaver, a pseudorandom spreader, a sensor node mask code, and a pseudorandom sequence generator.

Claim 27 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 25 wherein said space-time encoding further includes a counterclockwise multirate switch unit, K sensor channel memory banks, K spreaders, an orthogonal sequence generator, a dual-mode switch unit, a block sum, and a serial-to-parallel, where K is an integer.

Claim 28 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 27 wherein said counterclockwise multirate switch unit is an

interleaver down-sampling operation to produce K parallel sequences of a length of L/K with a chip rate of M Mcps from a single input sequence of a length of L with a chip rate of KM Mcps, where K and L are integers.

Claim 29 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 27 wherein said dual-mode switch unit is used to form either multiple-input multiple-output or single-input multiple-output followed by the block sum and the serial-to-parallel.

Claim 30 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 27 wherein said orthogonal sequence generator produces all of the sequences with orthogonal each other.

Claim 31 (new): The multiple-input multiple-output wireless sensor networks communication system of claim 27 wherein said each of K spreaders is an exclusive-OR (XOR) operation.

Claim 32 (new): A multiple-input multiple-output space-time sensor basestation system comprising:

N antennas coupled to a demodulation and radio frequency receiver;

the demodulation and radio frequency receiver coupled to a space-time processor and decoding, and a multiple-input multiple-output channel estimate;

the space-time processor and decoding coupled to a space-time Rake processor and the multiple-input multiple-output channel estimate;

the space-time Rake processor coupled to a deinterleaver and forward error correction decoding;

the multiple-input multiple-output channel estimate is connected to the space-time processor and decoding and the space-time Rake processor; and

a pseudorandom sequence generator coupled to the space-time Rake processor.

Claim 33 (new): The multiple-input multiple-output space-time sensor basestation system of claim 32 wherein said space-time processor and decoding further includes a space-time matrix equalizer, K despreaders, K receiver channel memory banks, a clockwise multirate switch unit, and an orthogonal sequence generator.

Claim 34 (new): The multiple-input multiple-output space-time sensor basestation system of claim 33 wherein said space-time matrix equalizer is a space-time minimum mean square error (MMSE) equalizer.

Claim 35 (new): The multiple-input multiple-output space-time sensor basestation system of claim 33 wherein said clockwise multirate switch unit is a deinterleaver up-sampling operation to form a single sequence of a length of L with KM Mcps from K parallel sequences of a length of L/K with M Mcps, where L and K are integers.

Claim 36 (new): A wireless multiple-input multiple-output sensor node and transceiver system comprising:

 a sensor array unit coupled to an analog-to-digital converter unit;

 the analog-to-digital converter unit coupled to a signal processing and data computing unit;

 the signal processing and data computing unit coupled to a multiple-input multiple-output space-time transceiver that is connected to N antennas;

 a memory bank coupled to the analog-to-digital converter, the signal processing and data computing unit, and the multiple-input multiple-output space-time transceiver;

 a power generator coupled to a power unit; and

 the power unit coupled to the sensor array unit, the analog-to-digital converter, the signal processing and data computing unit, and the multiple-input multiple-output space-time transceiver.

Claim 37 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 36 wherein said power generator is one of type powers including sunlight solar cells, low-power DC source, or any combinations.

Claim 38 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 36 wherein said power unit has four operation modes including a full operation mode, a sleep mode, a wake-up mode, and a partial operation mode.

Claim 39 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 38 wherein said partial operation mode is used to operate anyone of units including the sensor array unit, the analog-to-digital converter unit, the signal processing and data computing unit, the memory bank, the multiple-input multiple-output space-time transceiver, or any combinations.

Claim 40 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 36 wherein said the analog-to-digital converter unit includes N analog-to-digital converters in parallel, where N is an integer.

Claim 41 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 40 wherein said N analog-to-digital converters in parallel can be operated in full or in partial.

Claim 42 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 36 wherein said sensor array unit contains N parallel sensors, where N is an integer.

Claim 43 (new): The wireless multiple-input multiple-output sensor node and transceiver system of claim 41 wherein said N parallel sensors can be fully or partially operated.